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<110> Vreeland, Valerie
      Ng, Kwan L.
      The Regents of the University of California
<120> Recombinant Vanadium Haloperoxidases and Their Uses
<130> 023070 087100US
<140> 09/151,189
<141> 1998-09-10
<160> 11
<170> PatentIn Ver. 2.0
<210> 1
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<222> (228)..(2258)
<223> vanadium bromoperoxidase

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His	Ala	Ala	Asp	Thr	Thr	Arg	Gly	Ser	Pro	Met	Pro	Asp	Thr	Gly	Val	
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Leu	Glu	Gly	Glu	Lys	Ser	Leu	Gly	Phe	His	Pro	Ser	Glu	Thr	Pro	Tyr	
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Ile	Lys	Tyr	Leu	Glu	Gly	Ser	Glu	Thr	Trp	Lys	Lys	Val	Lys	Leu	Pro	
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Thr	Asp	Gly	Ile	Ser	Ala	Ser	Lys	Ile	Leu	Gly	Lys	Ile	Met	Ala	Arg	
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gtc	cgc	atc	gct	acc	gcc	ttg	gct	gtg	gta	ctg	gcc	gca	ccc	tgt	ttg	524
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2

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 Cys Gln Ile Thr Asn Gly Glu Thr Asp Leu Ala Thr Met Phe His Lys
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 Ile Leu Glu Asp Cys Ile Leu Asn Gly Asp Phe Ser Ile Cys Glu Asp
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 Val Pro Ala Gly Asp Pro Ala Gly Arg Leu Val Asn Pro Thr Ala Ala
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 Phe Ala Ile Asp Ile Ser Gly Pro Ala Phe Ser Ala Thr Thr Ile Pro
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 Pro Val Pro Thr Leu Ser Ser Pro Glu Leu Ala Ala Gln Leu Ala Glu
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 Asp Pro Phe Ser Gln Leu Phe Arg Ala Thr Phe Val Gly Val Glu Thr
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3

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 Ile Thr Val Glu Pro Lys Gln Glu Thr Phe Ala Pro Asp Leu Asn Tyr
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 Tyr Arg Gly Ser Leu Ile Leu Leu Glu Leu Gly Ala Phe Ser Arg Pro
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 Thr Pro Tyr Ile Lys Tyr Leu Glu Gly Ser Glu Thr Trp Lys Lys Val
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 Lys Leu Pro Thr Asp Gly Ile Ser Ala Ser Lys Ile Leu Gly Lys Ile
 65 70 75 80
 Met Ala Arg Val Arg Ile Ala Thr Ala Leu Ala Val Val Leu Ala Ala
 85 90 95
 Pro Cys Leu Ala Phe Asp Glu Val Thr Ala Ser Gly Val Phe Pro Glu
 100 105 110
 Glu His Lys His Thr Gly Glu Gly Arg His Leu Gln Thr Cys Thr Asn
 115 120 125
 Ser Asp Asp Ala Leu Asp Pro Thr Ala Pro Asn Arg Arg Asp Asn Val
 130 135 140
 Ala Phe Ala Ser Arg Arg Asp Ala Ala Arg Arg Glu Arg Asp Gly Thr
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 Gly Thr Val Cys Gln Ile Thr Asn Gly Glu Thr Asp Leu Ala Thr Met
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 Phe His Lys Ser Leu Pro His Asp Glu Leu Gly Gln Val Thr Ala Asp
 180 185 190
 Asp Phe Ala Ile Leu Glu Asp Cys Ile Leu Asn Gly Asp Phe Ser Ile
 195 200 205
 Cys Glu Asp Val Pro Ala Gly Asp Pro Ala Gly Arg Leu Val Asn Pro
 210 215 220
 Thr Ala Ala Phe Ala Ile Asp Ile Ser Gly Pro Ala Phe Ser Ala Thr
 225 230 235 240
 Thr Ile Pro Pro Val Pro Thr Leu Ser Ser Pro Glu Leu Ala Ala Gln
 245 250 255
 Leu Ala Glu Leu Tyr Trp Met Ala Leu Ala Arg Asp Val Pro Phe Met
 260 265 270
 Gln Tyr Gly Thr Asp Glu Ile Thr Thr Thr Ala Ala Ala Asn Leu Ala
 275 280 285
 Gly Met Gly Gly Phe Pro Asn Leu Asp Ala Val Ser Ile Gly Ser Asp
 290 295 300
 Gly Thr Val Asp Pro Phe Ser Gln Leu Phe Arg Ala Thr Phe Val Gly
 305 310 315 320
 Val Glu Thr Gly Pro Phe Val Ser Gln Leu Leu Val Asn Ser Phe Thr
 325 330 335
 Ile Asp Ala Ile Thr Val Glu Pro Lys Gln Glu Thr Phe Ala Pro Asp
 340 345 350

6

Leu Asn Tyr Met Val Asp Phe Asp Glu Trp Leu Asn Ile Gln Asn Gly
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 Gly Pro Pro Ala Gly Pro Glu Glu Leu Asp Glu Glu Leu Arg Phe Ile
 370 375 380
 Arg Asn Ala Arg Asp Leu Ala Arg Val Ser Phe Val Asp Asn Ile Asn
 385 390 395 400
 Thr Glu Ala Tyr Arg Gly Ser Leu Ile Leu Leu Glu Leu Gly Ala Phe
 405 410 415
 Ser Arg Pro Gly Ile Asn Gly Pro Phe Ile Asp Ser Asp Arg Gln Ala
 420 425 430
 Gly Phe Val Asn Phe Gly Thr Ser His Tyr Phe Arg Leu Ile Gly Ala
 435 440 445
 Ala Glu Leu Ala Gln Arg Ala Ser Cys Tyr Gln Lys Trp Cln Val His
 450 455 460
 Arg Phe Ala Arg Pro Glu Ala Leu Gly Gly Thr Leu His Asn Thr Ile
 465 470 475 480
 Ala Gly Asp Leu Asp Ala Asp Phe Asp Ile Ser Leu Leu Glu Asn Asp
 485 490 495
 Glu Leu Leu Lys Arg Val Ala Glu Ile Asn Ala Ala Gln Asn Pro Asn
 500 505 510
 Asn Glu Val Thr Tyr Leu Leu Pro Gln Ala Ile Gln Val Gly Ser Pro
 515 520 525
 Thr His Pro Ser Tyr Pro Ser Gly His Ala Thr Gln Asn Gly Ala Phe
 530 535 540
 Ala Thr Val Leu Lys Ala Leu Ile Gly Leu Asp Arg Gly Gly Glu Cys
 545 550 555 560
 Phe Pro Asn Pro Val Phe Pro Ser Asp Asp Gly Leu Glu Leu Ile Asn
 565 570 575
 Phe Glu Gly Ala Cys Leu Thr Tyr Glu Gly Glu Ile Asn Lys Leu Ala
 580 585 590
 Val Asn Val Ala Phe Gly Arg Gln Met Leu Gly Ile His Tyr Arg Phe
 595 600 605
 Asp Gly Ile Gln Gly Leu Leu Leu Gly Glu Thr Ile Thr Val Arg Thr
 610 615 620
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 625 630 635 640
 Arg Leu Phe Thr Gly Glu Val Ile Lys Leu Phe Gln Asp Gly Thr Phe
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7

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<211> 51
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Ascophyllum vanadium peroxidase active sites

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 <213> Artificial Sequence

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 primer for short construct

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 <213> Artificial Sequence

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 <223> Description of Artificial Sequence:Fucus
 peroxidase ligation independent cloning (LIC) 3'
 primer for full length, mid length and short
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 Phe Ala Thr

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